NAVICULAR SYNDROME

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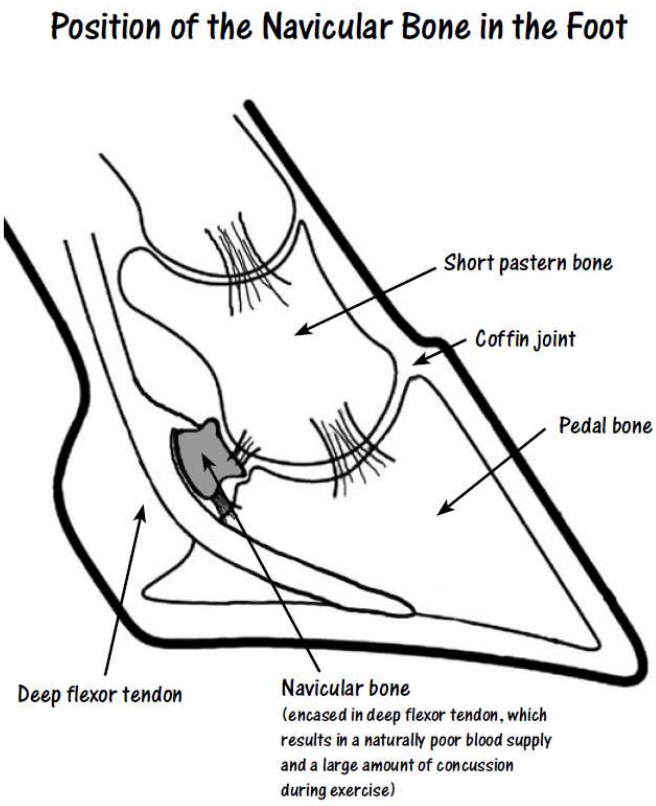

Summary

Navicular Syndrome (NS), also referred to as Caudal Heel Syndrome or Podotrochlosis, is perhaps one of the most frustrating of all hoof related lameness problems.

It was referred to as Navicular Disease up until recently, but it is not a disease as such. Establishing a definite diagnosis and treatment plan for Navicular Syndrome is difficult. However, new therapies and management techniques have improved the long- term outcomes and Navicular Syndrome is no longer regarded as a need for early retirement in a successful horse.

Racing and equestrian competition horses, especially geldings aged between 4 to 15 years of age and heavy chested horses, are the most likely to suffer from Navicular Syndrome due to the loading forces placed on the navicular bone and deep digital flexor tendon during fast exercise and concussive loading on hard surfaces. Early prevention and management methods such as corrective shoeing, as well as supplementation to help maintain joint health and function, are helpful in reducing the clinical signs and lameness associated with Navicular Syndrome.

What causes Navicular Syndrome (NS)?

The 'scratchy' shortened stride with a stumbling, shuffling gait in one or both front limbs is characteristic of navicular bone pain. It is rarely diagnosed in young horses or in the hind limbs. It is the most frustrating of all hoof related lameness problems in terms of establishing a definite diagnosis, an effective treatment and successful management in racing and equestrian competition horses.

The navicular bone (or distal sesamoid bone) is a small bone, about 50 mm long and as thick as the average small finger on a human hand. It acts as a 'pulley' for the deep flexor tendon as it passes under the heel area to attach on the under surface of the pedal bone. It is encased within the deep flexor tendon and therefore has a naturally limited blood supply, especially in breeds of horses with small hooves, heavy shoulders and those with long toe-low heel conformation or a history of inadequate hoof trimming or poor farriery. When a horse accelerates, turns or stops suddenly on its heels (such as a cutting, roping, barrel racing or polo horse) the navicular bone is loaded with extreme pressure within the deep flexor tendon and associated structures, its blood supply is reduced and it is concussed within the heel area. The average 'use by' date of a navicular bone in a heavyweight horse performing high loading or concussive activity is estimated to be 5 – 7 years, before irreversible degenerative processes begin within the bone, development of bursitis in the coffin joint and associated soft tissues in the heel area.

Studies have shown that the risk of NS is inherited in bloodlines of horses with a history of chronic and progressive front limb lameness, with a 36% heritable chance of a NS affected stallion passing the recessive gene to his progeny.

Common Symptoms of Navicular Syndrome

Navicular Syndrome exhibits as a subtle front limb lameness in one or both limbs, particularly during exercise. Usually early signs can become less apparent after the horse is 'warmed up' during the training session. However, the horse can noticeably limp after 'cool down' or during the first four steps in the morning after overnight rest.

Early signs include a history of stumbling, developing a shuffling short stride or 'proppy' gait on one or both front limbs, often transferring weight alternatively to the 'good' limb. This short, straight shouldered, more upright gait can commonly be confused with a shoulder injury or 'tying up' in the shoulder during exercise.

More advanced signs include wearing away the front toes more quickly as the horse attempts to land toe-first when exercising instead of the normal heel-first pattern at the walk or trot. You may notice the horse 'skidding' the surface and dragging the toe(s) to minimise weight bearing on the heel due to pain in this area (as recognised with the term caudal heel pain).

Chronic cases are characterised by worn away toes and often chipped toes on the front hooves, as well as narrowing of the quarters and deepening of the frog sulci. This results in upright heel shape or a 'box-like' appearance of the hoof on one or both limbs. Most horses have more developed signs in one front hoof, but about 20% have typical symptoms in both front hooves.

Symptoms often become less noticeable with rest or spelling but return once daily exercise resumes.

In some cases, an affected horse will dig a small hole in sand or bedding and stand so its heels are raised to reduce weight bearing on the heels. Other horses will be reluctant to turn to the side, especially of the sore hoof, often stumbling and limping for a few strides after loading the affected limb.

HANDY HINT - New Underlying Causes of Navicular Syndrome

Navicular syndrome is now thought to be caused by both bone dissolution and fibro-cartilage collapse as the navicular bone is positioned on the rear border of the coffin joint. Radiographic (X-ray) changes indicating internal dissolution, fibro-cartilage deterioration and coffin joint osteoarthritic changes are helpful diagnostic signs of navicular syndrome. These should be combined with mid-pastern nerve blocks and a full lameness evaluation to establish a definite diagnosis, confirmed by MRI imaging.

Modern Diagnostic Methods

Navicular syndrome involves the progressive deterioration of both the navicular bone and arthritic changes associated with its surface of contact with the rear of the 'coffin' joint and pedal bone. It has been traditionally diagnosed by X-ray of the heel area. Advanced diagnostic methods using Magnetic Resonance Imaging (MRI) have provided new evidence to pin point the underlying changes which are associated with the soft tissue and cartilage, as well as bone demineralisation, which occurs on the lower border of the navicular bone where it articulates (connects) with the coffin joint.

Standard X-ray diagnosis relied on classifying the type, size and number or enlarged nutrient vessels or vascular channels, referred to as 'lollypops', on the lower border of the navicular bone. MRI scans have now been able to identify soft tissue from the joint (synovial) membrane inside the 'lollypops', with the blood (nutrient) vessels being very small in horses with navicular syndrome. Sound horses have 3 – 5 cone-shaped synovial 'holes' along the border of the navicular bone, but up to 11 % of normal horses have larger 'lollypop' holes.

More recent MRI evidence suggests that venous congestion (blood build-up) and joint fluid pressure accumulates within the navicular bone. This causes the whole 'coffin' joint structure inside the hoof to develop progressive arthritic changes, possibly due to chronic concussion and bone overloading in exercising horses. The build-up of low

oxygen blood and fluid creates pressure within the navicular bone, causing painful internal dissolution of the bone and weakness of the navicular structure. This can result in eventual rupture of the fluid 'pressure' out through the lower border of the navicular bone into the coffin joint. One study, involving exercising horses on a high-speed treadmill, found that changes developed within the fibro-cartilage on the lower border. This damaging progression is associated with high loading and is more likely in heavy weight horses, especially horses with small hooves, or those subjected to hard, concussive exercise.

The bone changes are not linked to the normal, beneficial remodelling processes in lower limb bones as a response to exercise loading. The progressive process of NS that can take years to develop, so it is not really a 'disease' as such of the navicular bone, as was previously thought until recently. Demineralisation of the deep digital flexor tendon attachment within the navicular area is considered to cause the chronic form of Navicular Syndrome. A weakened, decalcified navicular bone has an increased risk of fracture and advanced osteoporotic changes.

Veterinary Diagnosis of Navicular Syndrome

There are 5 main clinical methods used to identify progressive navicular bone changes. The diagnosis is a job for your vet. These include:

1. Assessment of front limb movement

An objective lameness exam on the circle lunge or under saddle is often the first step in identifying the change in front limb movement associated with caudal heel pain in horse. Affected horses develop a 'shuffling, short-stepping gait, landing on the toe first rather than the normal heel first ground contact, when viewed from the side at a walk or trot. Many severely affected horses stand and shift weight from one limb to the other to ease the discomfort of weight bearing on the heels.

2. Symmetrical Examination of Hoof Shape

The typical chronic navicular affected hoof has a boxy shape, with high narrow heels (as less weight is carried to expand the heels due to dull caudal heel pain), more upright quarters, sunken frog with deep bordering grooves (sulci) and short worn away toes with evidence of toe 'scrub' and wear due to landing toe first and skidding on hard surfaces (eg a roadway) when exercising.

3. Pain on Hoof Tester Application

It is important for your vet to access how your possibly NS affected horse perceives pain in the heel area. Your vet or farrier will often be able to elucidate a hoof withdrawal response of both front hooves in many, but not all horses with NS, when hoof testers are applied with force across the heels and frog.

5. Palmer Digital Nerve Blocks

The palmer digital nerves (PDNs) in the mid-section on each side of the rear of the pastern provide the pain sensation to the heel area in a horse with caudal heel area pain. Normally your vet will need to clip the rear of the pastern in horses with a long coat to help locate the PDNs. After a small amount of local anaesthetic is deposited around the nerves on the most affected hoof, the sensory nerves will be blocked after 15-20 minutes. A horse with caudal heel pain will often then trot off sound with a normal heel then toe hoof fall.

4. Fetlock Flexion Tests

With the horse standing with one front hoof off the ground, the fetlock is bent back to the rear of the limb and held firmly for 30 seconds. On dropping the hoof to the ground, the horse is immediately trotted off over 25-30 metres in a straight line. If the caudal heel pain is relieved by the PDN block, the horse will trot off sound after 4-5 strides. The PDN block is normally repeated on the adjacent limb to determine if both hooves are affected if the horse can trot off sound with normal heel-then toe hoof fall.

5. Navicular Radiographs (X-Rays)

After the hoof has been positioned a special wooden block to raise the frog and point the toe downwards, with the radiographic plate held vertically across the heel, radiographs are taken from the front of the hoof wall in a downward slope to highlight the degree of navicular 'lolly-popping' and bone changes within the navicular bone and the coffin joint.

6. Magnetic Resonance Imaging (MRI)

MRI is now the definitive method to investigate the early changes within the navicular bone, allowing detailed imaging of both soft tissue and bone changes within the hoof.

The early MRI studies found that navicular bones of horses with chronic caudal hoof pain and lameness had increased fluid in the navicular marrow cavity, indicating an early inflammatory change. When the inflammation increases, it causes discomfort and load bearing lameness and it can eventually burst out of the back of the navicular bone to adhere to the deep flexor tendon, resulting in bony changes within the joint structure of the coffin joint (short pastern and pedal bone joint) and resulting severe chronic lameness.

Whilst corrective shoeing and anti-inflammatory medications are effective, MRI has helped researchers and veterinarians find a better, more effective early treatment to give horses a longer, active life.

Management of Navicular Syndrome

1. Early cases: 2-3 Months Rest and Corrective Trimming or Shoeing

The new findings which reveal osteoarthritis and internal navicular collapse have pioneered a whole new way of managing both early and advanced Navicular Syndrome. Horses less than 6 – 7 years of age, with mild navicular symptoms and minor internal changes and minimal vascular congestion on MRI, may respond to 2-3 months rest, combined with barefoot trimming aimed at reducing the rear loading axis on the heels and navicular bone. This is achieved by rolling the toes and raising the heels to relieve the loading strain on the deep digital flexor tendon and the risk of fibro-cartilage damage. This treatment program can help return a horse to soundness over a period of 2-3 months.

2. Pain Management

The relief of pain for both humane purposes and reduce the internal navicular inflammation with carefully managed doses of an anti-inflammatory drug, such as 'bute' or firocoxib, helps to improve comfort and reduce internal vascular and inflammatory pressure within the navicular bone and coffin joint.

However, as NS is a progressive degenerative problem within the navicular bone and its fibro-cartilage border, total pain relief to enable continued hard exercise with little discomfort and return to soundness is to be carefully considered by your veterinarian.

3. Internal Bone regeneration using Bisphosphonate Medication

In 2003, a new class of drug used to treat Paget's Disease and old-age osteoporosis in humans was evaluated for NS horses to help reduce the internal bone remodelling process and pain associated with bone reabsorption. These drugs bind to osteoclast cells responsible for bone cell reabsorption which causes decalcification and develops structural weakness with the bones. A course of bisphosphonate injections can help reverse the deterioration within the navicular bone. Clinical evaluations and X-rays in a Colorado USA trial in 2008, indicated that a 5 day course of bisphosphonates had little benefit, but horses medicated for 10 days had a 5 – 10 % increase in navicular bone density, and these horses returned to normal exercise and training within 2 – 6 months with no signs of ongoing lameness or signs of Navicular Syndrome.

However, although biphosphonate therapy is useful in the treatment of NS, this class of drug only acts on bone osteoporotic conditions and not soft tissue or arthritic changes within the navicular bone and coffin joint. Bisphosphonate drugs can cause colic in horses and damage a horse's kidneys. They must not be used in conjunction with NSAID drugs, such as 'bute', because both drugs are excreted via the kidneys and overloading kidney excretion action can reduce kidney function and the animal's long-term health.

Bisphosphonates are useful to improve bone density, increasing capacity of the navicular bone to withstand mechanical loading in an exercising horse. They may reduce the risk of navicular fracture due to bone decalcification or osteoporosis, for example, in an aged jumping horse as it lands heavily on its front hooves onto a compacted surface.

4. **Extracorporeal Shock Wave Therapy (ECSWT)**

The use of high-intensity sound waves, focused on the soft tissue structure of the deep flexor tendon and ligament attachments to the navicular bone within the coffin joint, have been trialled to help relieve pain and shorten healing time of collagen tissue in these ligament structures identified by MRI scans. It is not recommended for bone related dissolution where bisphosphonate therapy may be useful, but shock wave therapy can make a horse more comfortable, especially when combined with bisphosphonate therapy for bone repair, in place of combined bisphosphonate and NSAID drug therapy for pain control that could likely increase the risk of kidney damage.

HANDY HINT – Magnetic Bell Boots

Magnetic bell boots may have some benefit to help increase circulation within the hoof and benefit blood supply to the navicular bone.

The magnetic field strength of the bell boots is an important consideration, they should be at least 3,000 Gauss for the magnetic field to penetrate into the hoof structure. An estimate of the 'strength' of the magnetic field can be performed by testing the attraction of the bell boots to a steel surface, such as a float wall. They should exhibit a moderately strong 'pull' and hold themselves to the wall without support.

You can fit the pair of magnetic bell boots to both front hooves for 12 hours whilst the horse is in a yard or stable. It is not recommended (or needed) to exceed 12 hours of use per day.

5. **'Neurectomy' or Severing the Heel Pain Sensory Nerves**

The so-called 'last resort' to relieve intense navicular pain sensation in the heels of a NS affected hors, has been a neurectomy, referred to as 'denerving' to surgically cut the sensory nerves at the lower pastern level, so that the unsound horse cannot feel pain in the heel area and return to full training and competition. Unfortunately, the horse cannot feel the painful 'prick' of a misguided shoeing nail in the hoof driven into the sensitive lamellae, laminitis or a hoof abscess and does exhibit typical discomfort or lameness. Thus, this can create problems in locating abscesses, diagnosing a laminitic episode and a potentially tetanus risk of a nail 'prick'.

Although de-nerving can provide initial relief of chronic NS symptoms, up to 75 % of de-nerved horses become lame again within 12 months due to ongoing fibro-cartilage collapse and other complications. Surgery to cut the distal navicular ligament to reduce the articular pressure on the coffin joint, can provide similar short term relief, but the progressive deterioration and osteoarthritic changes often result in return of NS lameness within 6 – 12 months in competitive sport horses. In some cases, a neurectomy may provide relief from navicular pain for 4-5 years

Also, painful neuroma formation, or a very sensitive severed end of the palmar digital nerve on one or both sides, can mushroom out to form a 'bulb' of hypersensitised nerve tissue. The hypersensitive nerve ending results in the horse being acutely aware of the nerve ending contact with bell boots, pastern bandages and holding the back of the pastern during hoof trimming, making the horse extremely unpredictable and often lame again.

6. **Corticosteroid Injection into the Navicular Bursa**

The deposition of long acting anti-inflammatory synthetic corticosteroid injections into the two sacs of the navicular bursa within the coffin joint, is helpful to provide temporary relief from the constant pain and lameness of NS. A horse with a positive fetlock flexion test may benefit in the short term from a corticosteroid injection into the

navicular bursa to reduce the inflammation. This can provide relief within 5-7 days and once the horse is sound, it is considered best to put it back into light work to restore hoof circulation and weight bearing, rather than restrict the animal to stable rest.

Most veterinarians of large equine specialist practices which have MRI imaging, will inject the navicular bursa under the guidance of the MRI scan to ensure that the corticosteroid is placed into the navicular bursa for optimum results and less risk of side-effects associated with incorrect injection placement.

7. Benefits of a Daily Joint Supplement

There has been practical benefit from supplementation with an equine joint supplement to help restore the environment and health of the articular surfaces of the coffin joint.

There is a myriad of joint supplements available as they are the most common supplement given orally to exercising and aged horses. Kohnke's Own Redi-Flex is a comprehensive joint supplement with over 10 high potency, joint-active nutrients which benefit joints, ligaments and tendons. Trials during the development of Redi-Flex included case studies of horses which had been diagnosed with Navicular Syndrome. There was a positive benefit recorded from daily use of Redi-Flex long term at the initial supplementary rate. Horses showed improvement in their gait and stride length with increased willingness of movement and reduced lameness.

Redi-Flex can be considered as a complementary supplement to other management used to help NS horses return to work or lead a relatively pain free and active life as they age.

Prevention of Navicular Syndrome

It is well recognised that careful attention to maintaining proper hoof angles and balance by regular trimming is important. An experienced farrier checking for any changes in hoof shape, such as narrowing of the heels, upright quarters and sunken frogs with deep sulci, high heels and short toe conformation, excessive wear on the point of the toes and a stumbling, 'scratchy' gait, may determine the early signs of Navicular Syndrome

Early recognition and diagnosis is important to help manage and avoid the progressive deterioration which can end a horse's competitive career. NS also can lead to old age discomfort and reduced mobility which affects the quality of a horse's life and its ability to remain sound for grazing and light self-exercise.

HANDY HINT – Success of Corrective Trimming and Shoeing

Corrective barefoot trimming alone is successful in about 50 % of hacks and lightly worked horses suffering from Navicular Syndrome. Using an egg-bar shoe to extend, expand and support the forelimb heels, is effective in about 33 % of early navicular cases. However, ensure that the hind toes are kept short and squared off to prevent 'forging' and risk of 'heel chop' during workouts if egg-bar shoes are fitted. An experienced and knowledgeable farrier can assist in the effective management of NS.

As NS is heritable, it is prudent not to breed with high risk horses, such as NS affected stallions or their progeny with a history of NS. However, due to the 7-8 year period before NS signs are likely to appear, it may delay recognition of high risk NS affected individuals.